





Table ES-1. Summary of Data Needs and Their Resolution

Data Gap	Data Need No.	Data Need	Resolution of Data Need	Additional Data Collection	Scope of Work	Justification
Monitoring well coverage of the hydrologic unit presumed to contain the bulk of uranium contamination is uneven, with principal weaknesses in coverage at the footprints of former liquid waste disposal sites and near the perimeter of the plume, especially the west and southwest portions.	10	Fill coverage gaps in the groundwater monitoring network for the uranium plume by completing monitoring wells at each of the 11 characterization borehole sites.	Complete each of the 11 characterization boreholes (Figure 3-5) as a groundwater monitoring well. Unless other than expected conditions are encountered during characterization, well screens will be positioned to monitor the uppermost hydrologic unit, i.e., saturated Hanford formation sediment. New wells include two in the North Process Pond; one in South Process Pond; one in 300 Area Process Trenches, five in the west and southwest portions of uranium plume, and two near the Columbia River.	Yes	<p>Field sampling: Install new monitoring wells to cover the uppermost hydrologic unit in the unconfined aquifer.</p> <ul style="list-style-type: none"><li>• Install 11 new monitoring locations (same as for vadose zone characterization boreholes) (i.e., 2 in North Process Pond; one in South Process Pond; 1 in 300 Area Process Trenches; 5 in west and southwest portions of plume) and 2 near the Columbia River).</li><li>• Conduct quarterly sampling of each new monitoring well for the first year, with a reduction in frequency for subsequent years if warranted. <u>The quarterly groundwater sampling of remedial investigation wells required under this work plan has been completed. No further groundwater sampling will be conducted under this work plan.</u></li></ul> <p>Laboratory analyses:</p> <ul style="list-style-type: none"><li>• Use initial analysis of samples to establish baseline conditions at each new monitoring well. Methods are specified in DOE/RL-2002-11, <i>300-FF-5 Operable Unit Sampling and Analysis Plan</i>, Rev. 2, or its most recent update).</li><li>• Radiological contamination uranium (total, unfiltered sample), gross alpha, and gross beta.</li><li>• Chemical contamination chromium, nitrate, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene, and vinyl chloride.</li><li>• Basic water chemistry, including major anions and cations.</li><li>• Additional laboratory analyses based on site specific conditions, as warranted.</li></ul>	The network of wells used to monitor the uranium plume needs to be sufficiently comprehensive to describe the level of contamination with an uncertainty acceptable to decision makers. Data from the expanded monitoring network will permit estimates for the level of contamination, such as, volume of plume; mass of dissolved uranium; concentrations at exposure locations, and how the level changes with time. These estimates are information needed to evaluate natural attenuation and to define the extent of the environment potentially subject to remedial action.
The extent of VOC contamination to the north and northwest of Well 399-1-16B, is not clearly defined by the current monitoring well network.	11	Additional field observations of water quality in groundwater from the lower portion of the unconfined aquifer near Well 399-1-16B, particularly upgradient from the well and within the flow path from potential sources.	Evaluate groundwater quality within horizons immediately above and equivalent to the contaminated horizon observed at Well 399-1-16B during drilling at characterization borehole locations near that well (Figure 3-5).	Yes	<p>Collect groundwater samples during drilling at characterization borehole locations No. 6, No. 9, and No. 10 as drilling proceeds. Analyses to include VOCs, uranium, major anions, including nitrate and nitrite, and cations, and field parameters (temperature, pH, turbidity, specific conductance and dissolved oxygen). Use rapid turnaround VOC analysis to help select screen interval for completing monitoring wells at the three borehole locations. See Table 3-5 for drilling sampling details.</p>	Data from additional monitoring locations will reduce the uncertainty in describing the extent of this contamination and its possible source location. Additional field observations will improve estimates for the level of contamination and changes with time, which is information for the FS analysis of remedial action alternatives.



Table 3-4. Summary of Data Needs and their Resolution

Data Gap	Data Need No.	Data Need	Resolution of Data Need	Additional Data Collection	Scope of Work	Justification
300 Area Sources						
Monitoring well coverage of the hydrologic unit presumed to contain the bulk of uranium contamination is uneven, with principal weaknesses in coverage at the footprints of former liquid waste disposal sites and near the perimeter of the plume, especially the west and southwest portions.	10	Fill coverage gaps in the groundwater monitoring network for the uranium plume by completing monitoring wells at each of the 11 characterization borehole sites.	Complete each of the 11 characterization boreholes (Figure 3-5) as a groundwater monitoring well. Unless other than expected conditions are encountered during characterization, well screens will be positioned to monitor the uppermost hydrologic unit, i.e., saturated Hanford formation sediment. New wells include two in the North Process Pond; one in South Process Pond; one in 300 Area Process Trenches, five in the west and southwest portions of uranium plume, and two near the Columbia River.	Yes	<p>Field sampling: Install new monitoring wells to cover the uppermost hydrologic unit in the unconfined aquifer.</p> <ul style="list-style-type: none"><li>Install 11 new monitoring locations (same as for vadose zone characterization boreholes) (i.e., 2 in North Process Pond; 1 in South Process Pond; 1 in 300 Area Process Trenches; 5 in west and southwest portions of plume and 2 near the Columbia River).</li><li>Conduct quarterly sampling of each new monitoring well for the first year, with a reduction in frequency for subsequent years if warranted. <u>The quarterly groundwater sampling of remedial investigation wells required under this work plan has been completed. No further groundwater sampling will be conducted under this work plan.</u></li></ul> <p>Laboratory analyses:</p> <ul style="list-style-type: none"><li>Use initial analysis of samples to establish baseline conditions at each new monitoring well. Methods are specified in DOE/RL-2002-11, 300-FF-5 Operable Unit Sampling and Analysis Plan, Rev. 2, or its most recent update)</li><li>Radiological contamination uranium (total, unfiltered sample), gross alpha, and gross beta</li><li>Chemical contamination chromium, nitrate, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene, and vinyl chloride</li><li>Basic water chemistry, including major anions and cations</li><li>Additional laboratory analyses based on site specific conditions, as warranted.</li></ul>	The network of wells used to monitor the uranium plume needs to be sufficiently comprehensive to describe the level of contamination with an uncertainty acceptable to decision makers. Data from the expanded monitoring network will permit estimates for the level of contamination, such as, volume of plume; mass of dissolved uranium; concentrations at exposure locations, and how the level changes with time. These estimates are information needed to evaluate natural attenuation and to define the extent of the environment potentially subject to remedial action.
The extent of VOC contamination to the north and northwest of Well 399-1-16B, is not clearly defined by the current monitoring well network.	11	Additional field observations of water quality in groundwater from the lower portion of the unconfined aquifer near Well 399-1-16B, particularly upgradient from the well and within the flow path from potential sources.	Evaluate groundwater quality within horizons immediately above and equivalent to the contaminated horizon observed at Well 399-1-16B during drilling at characterization borehole locations near that well (Figure 3-5).	Yes	<p>Collect groundwater samples during drilling at characterization borehole locations No. 6, No. 9, and No. 10 as drilling proceeds. Analyses to include VOCs, uranium, major anions, including nitrate and nitrite, and cations, and field parameters (temperature, pH, turbidity, specific conductance and dissolved oxygen). Use rapid turnaround VOC analysis to help select screen interval for completing monitoring wells at the three borehole locations. See Table 3-5 for drilling sampling details.</p>	Data from additional monitoring locations will reduce the uncertainty in describing the extent of this contamination and its possible source location. Additional field observations will improve estimates for the level of contamination and changes with time, which is information for the FS analysis of remedial action alternatives.



intrusion is expected during high river stage conditions, specific conductance and temperature will be recorded by lowering a probe into the well before water sample collection (note: alternative field methods to observe vertical flow within a well bore are being investigated as part of the IFRC). For wells at locations where uranium concentrations rise significantly when the water table is elevated, water samples will be collected at the water table during the June sampling event.

- Field sampling:
  - o Select approximately eight well locations for tests, including subsets that represent:
    - (1) locations that show an increase in uranium concentrations when the water table is high,
    - (2) locations that show a decrease in uranium concentrations when the water table is high,
    - and (3) locations where uranium concentrations remain relatively constant (i.e., typically the perimeter areas of the plume). Perform depth-discrete sampling to provide a vertical profile of uranium concentrations at 1 m (3-ft) intervals throughout the open interval of the well.
  - o At wells near the river where river water intrusion is expected during high river stage conditions, measure specific conductance and temperature by lowering a probe into the well before water sample collection.
  - o For wells at locations where uranium concentrations rise significantly when the water table is elevated, develop and capture water samples at the water table during the June sampling event (approximately four inland well locations and four near river locations).
- Laboratory analyses: Analyze all collected water samples in accordance with the sampling and analysis plan for the 300-FF-5 OU (DOE/RL-2002-11).

Distribution data gap – uranium: Monitoring well coverage of the hydrologic unit presumed to contain the bulk of uranium contamination is uneven, with principal weaknesses in coverage at the footprints of former liquid waste disposal sites and near the perimeter of the plume, especially the west and southwest portions.

- Data Need 10: Fill coverage gaps in the groundwater-monitoring network for the uranium plume by completing monitoring wells at each of the 11 characterization borehole sites (Table 3-5 and Figure 3-5).
- Justification: The network of wells used to monitor the uranium plume needs to be sufficiently comprehensive to describe the level of contamination with an uncertainty acceptable to decision makers. Data from the expanded monitoring network will permit estimates for the level of contamination (e.g., volume of plume; mass of dissolved uranium; concentrations at exposure locations) and how the level changes with time. These estimates are information needed to evaluate natural attenuation and to define the extent of the environment potentially subject to remedial action.
- Resolution of data need: Each of the new characterization boreholes described in Table 3-5 will be completed as a groundwater-monitoring well. The screened interval as proposed in this work plan will cover the uppermost hydrologic unit in the unconfined aquifer. If unexpected conditions are discovered during the characterization phase of drilling, which will extend to the bottom of the unconfined aquifer, screen placement will be reconsidered. The new monitoring wells will be sampled quarterly for the first year to establish baseline conditions. Groundwater analyses will include radiological and chemical contamination, and basic water quality parameters, such as major anions, including nitrate and nitrite, and cations, and will be consistent with the sampling and analysis plan for the 300-FF-5 OU (DOE/RL-2002-11).

- Field sampling: Install new monitoring wells to cover the uppermost hydrologic unit in the unconfined aquifer.
  - Install 11 new monitoring locations (same as for vadose zone characterization boreholes) (i.e., 2 in the North Process Pond; 1 in the South Process Pond; one in the 300 Area Process Trenches; 5 in west and southwest portions of the plume; and 2 near the Columbia River).
  - Conduct quarterly sampling of each new monitoring well for the first year, with a reduction in frequency for subsequent years if warranted. The quarterly groundwater sampling of remedial investigation wells required under this work plan has been completed. No further groundwater sampling will be conducted under this work plan.
- Laboratory analyses: Use initial analysis of samples to establish baseline conditions at each new monitoring well. Analytical methods are described in DOE/RL-2002-11, *300-FF-5 Operable Unit Sampling and Analysis Plan*, Rev. 2, or its most recent update, and include the following (as of March 2010):
  - Radiological contaminants uranium (total, unfiltered sample), gross alpha, and gross beta
  - Chemical contaminants chromium, nitrate, trichloroethene, tetrachloroethene, cis-1,2-dichloroethene, and vinyl chloride
  - Basic water chemistry, including major anions and cations, along with field parameters temperature, pH, specific conductance, and dissolved oxygen
  - Additional laboratory analyses based on site-specific conditions, as warranted

Distribution data gap – cis-1,2-dichloroethene at Well 399-1-16B: The extent of VOC contamination to the north and northwest of Well 399-1-16B is not clearly defined by the current monitoring well network.

- Data Need 11: Additional field observations of water quality in groundwater from the lower portion of the unconfined aquifer near Well 399-1-16B, particularly upgradient from the well and within the flow path from potential source locations.
- Justification: Data from additional monitoring locations will reduce the uncertainty in describing the extent of this contamination and its possible source location. Additional field observations will improve estimates for the level of contamination and changes with time, which is information needed for the FS analysis of remedial action alternatives.
- Resolution of data need: Groundwater samples for VOCs, uranium, major anions, including nitrate and nitrite, cations, and field parameters (temperature, pH, turbidity, specific conductance and dissolved oxygen) analyses will be collected during characterization borehole drilling at locations No. 8 and No. 9 (North Process Pond), location No. 10 (300 Area Process Trenches), and location No. 6 (a near-river site east of the former sanitary leach trenches) from depths that reach a comparable hydrologic unit in the unconfined aquifer as at Well 399-1-16B (Figure 3-5). Groundwater samples will be collected for VOC analysis from various depths within the unconfined aquifer as drilling proceeds, and the oxidizing/reducing characteristics of each sample interval will be documented in the drilling logs. If significant levels of contamination are encountered during drilling in the lower portion of the unconfined aquifer, completion of the borehole as a monitoring well may include positioning the screen in the lower portion of the aquifer (i.e., a “-B” horizon well), following concurrence by the regulatory agencies.